

Mission Summary

Hurricane Georges - Winds at Landfall

980928H Aircraft N42RF

Scientific Crew (N42RF)

Chief Scientist	John Gamache
Observer	Hugh Willoughby
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Workstation	Paul Leighton
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AXBT	Dan Cecil (Texas A&M)
Cloud Physics	Dale Carpenter (AOC)

Mission Briefing:

At mission planning time, Hurricane Georges was officially a category 2 hurricane bearing down on the Gulf coast, with New Orleans a possible target. HRD wind analyses suggested, however, that the storm had maximum surface winds of about 75 knots, and thus was a category 1 storm. WSR-88D radar composite loops immediately before take-off indicated that the hurricane no longer had a closed radar eye, but instead was open to the southwest. Little precipitation was evident to the west of the eyewall. Previous reconnaissance flights suggested that the strongest wind would be found well to the east (~100 nm) of the hurricane center.

The mission selection was a Winds at Landfall experiment, and the flight was expected to be about 9 hours long. Take-off was scheduled for 0300 UTC, 28 September, or 2300 EDT, 27 September, from MacDill Air Force Base in Tampa, Florida.

The expected flight plan began with, N42RF flying over buoys located to the east of the center, then a pass through the center, followed by a flight leg over to 91°W, or about 100 nm to the west of the expected center location. N42RF would then fly to a position 75 nm approximately SE and then SW of the storm center, before beginning a "figure 4" pattern that was also lined up approximately along radials to both Slidell and Mobile WSR-88D Doppler radar sites. After the Figure 4 the aircraft would do one more radial outward from Slidell, fly 100 nm to the SE of the storm center and set up on a radial to the Doppler radar at Eglin Air Force Base, Florida. This would be followed by a coastal survey during which several drops would be done, including near a portable profiler station. Several more radials centered on Slidell, were planned, followed by a southern route back to MacDill. During the mission 6 Airborne Expendable Bathythermographs (AXBT's) were to be dispatched to measure the sea-surface temperature under Georges.

Mission Synopsis:

Figure 1 shows the flight track for the on station portion of the flight. N42RF departed MacDill Air Force Base at 030713 UTC. During its ferry to the storm center it dropped sondes and AXBT's over buoys 42039 and 42040. It then fixed the center at 0431 UTC at 29.61°N, 88.64°W, where it dropped a sonde that showed a central pressure of 960 mb. It then headed westward to 29.3°N, 91.3°W, essentially along the coast. The turning point represents the point furthest west in the flight. Flight-level winds on this side were 35 kts.

The aircraft then proceeded to the points 75 nm SW and SE of the storm center. At the point SE an AXBT indicated a sea-surface temperature (SST) of 25.6°C. N42RF then passed through the center on a NW track to the Slidell WSR-88D site. This was also the first of the 2 EVTD Doppler runs, so the tail radar was scanned in perpendicular continuous mode. From there it flew south after dropping a sonde in Lake Ponchartrain. On this pass and throughout the night the lights of New Orleans could be seen. The plane proceeded south, dropping a sonde near a C-MAN station. As it lined up to begin its NE EVTD run (see

Figure 2 for display of EVTD winds at 1-km level) N42RF also dropped a sonde near the BURL1 C-MAN station. Again the tail radar was operated in continuous perpendicular scanning as it flew on a radial toward the Mobile WSR-88D site. The plane turned left flew along the coast, and again turned at Slidell, dropping another sonde into Lake Ponchartrain.

The center was then fixed for the second time at 0734 UTC at a position of 30.03°N, 88.7°W, and the dropsonde showed a surface pressure of 959 mb. The plane then proceeded to a point about 100 nm to the SE of the storm center, where an AXBT revealed an SST of 27.3°C. N42RF then flew approximately along a radial toward Eglin Air Force Base, proceeding to a point nearly directly over the coast. The convection here, at a position nearly 200 nm from the storm center, was the most intense. The rainband consisted of a series of high reflectivity cells, and observations indicated fairly strong vorticity along the line. The pilots had to pick their way through the convection until they reached Pensacola, Florida. From there eastward the flight was less choppy. It was decided to make four runs along the coast (2 round trips) between Pensacola and Slidell to map the winds along the coast and near the storm center, since the storm center was nearly over the coast. During the seventh pass through the storm center (last westward pass) the center was fixed and the last eye sounding done. The sonde showed a surface pressure of 961 mb, and the center was 30.23°N, 88.84°W. The radar structure during the last pass through the storm center is shown in Figure 3.

During the passage from Pensacola to MacDill on the way back, the aircraft had to pass through the convective rainband. Flight-level winds just to the west were 35 kts while just to the east they were measured at over 70 kts. The aircraft landed at MacDill at 1142 UTC, for a total flight time of 8 hours, 35 minutes. Dropsonde winds available at 925 mb are shown in Figure 4.

Evaluation:

The mission appears to have been highly successful, mapping the winds near landfall, using airborne and WSR-88D Doppler radars, and portable profilers and ground-based Doppler radars. Thirty-four sondes were also dropped, helping to map the winds in the eyewall, as well as document the vertical structure of the boundary-layer winds along the coast, for comparison with C-Man and buoy observations. The airborne Doppler radar appeared to work perfectly, and an EVTD wind analysis was radioed back to the hurricane center, showing the winds out to about 70 km from the storm center. There will also be some close-up Doppler observations of the intense cells in the convective rainband well to the east of storm center. Finally the flight was able to accompany the storm center right to the coast line before ending its mission. The passes back and forth along the coast line should provide a continuous Doppler mapping of the winds.

Problems:

1) Three GPS dropsondes worked poorly enough not to transmit the data back to the hurricane center. The other 31 were worked up and sent out.

John Gamache
5 October 1998

Flight points

Point	Time	Position	Comments
T/O	030713 UTC	MacDill AFB	
1	033637 UTC	28° 30'N, 84° 32'W	Buoy 42036
2	035408 UTC	28° 49'N, 86° 02'W	Buoy 42039
3	042327 UTC	29° 12'N, 88° 14'W	Buoy 42040
4	043100 UTC	29° 37'N, 88° 38'W	eye fix (4 kts)
5	044830 UTC	29° 18'N, 90° 03'W	
6	050348 UTC	29° 12'N, 91° 15'W	Westernmost portion of flight
7	050518 UTC	29° 13'N, 91° 16'W	
8	052315 UTC	28° 45'N, 89° 37'W	
9	054503 UTC	29° 2'N, 87° 39'W	
10	060240 UTC	29° 43'N, 88° 45'W	CPA to hurricane center (25 kts)
11	062000 UTC	30° 13'N, 89° 56'W	Slidell/Lake Ponchetrain
12	063200 UTC	29° 17'N, 89° 57'W	Grand Isle C-MAN
13	063948 UTC	29° 4'N, 89° 26'W	
14	065420 UTC	29° 57'N, 88° 43'W	CPA to hurricane center (9 kts)
15	070150 UTC	30° 24'N, 88° 22'W	
16	071927 UTC	30° 15'N, 89° 56'W	Slidell/Lake Ponchetrain
17	073407 UTC	30° 02'N, 88° 42'W	eye fix (4 kts)
18	075730 UTC	28° 52'N, 87° 24'W	Beginning of Eglin radar radial
19	081740 UTC	30° 16'N, 86° 14'W	End of Eglin radar radial (conv. Rainband)
20	085030 UTC	30° 11'N, 88° 50'W	eye fix (5 kts)
21	090200 UTC	30° 07'N, 89° 47'W	West end of coastal run
22	091350 UTC	30° 14'N, 88° 48'W	eye fix (2 kts)
23	093150 UTC	30° 11'N, 87° 17'W	easternmost point of coastal run
24	095210 UTC	30° 10'N, 88° 51'W	CPA to hurricane center (22 kts)
25	100230 UTC	30° 12'N, 89° 39'W	westernmost point of coastal run
26	101200 UTC	30° 19'N, 88° 54'W	eye fix (5 kts)
27	103340 UTC	30° 01'N, 87° 09'W	easternmost point of coastal run (climb home)
Land	114200 UTC	MacDill AFB	

GPS Sonde Drops

Drop	Sonde ID	Time	Position		comments
1	981820039	033640	28.50	84.50	Eye Drop
2	982630092	035408	28.82	86.03	AXBT 27.3 C
3	981130033	042327	29.19	88.25	SE eyewall
4	983310085	043109	29.62	88.64	Eye
5	981820005	044826	29.30	90.03	
6	981830005	050511	29.21	91.27	
7	982720417	052318	28.76	84.62	Eye Drop
8	974530097	054502	29.03	87.62	Rainband
9	982720415	055821	29.55	88.49	SE Eyewall
10	982710019	055840	29.58	88.54	SE Eyewall
11	984510077	062051	30.24	84.93	
12	981830020	063159	29.29	89.95	
13	982720413	063943	29.07	89.44	
14	981750006	065819	30.19	88.53	NE Eyewall (bad winds)
15	981820029	070117	30.35	88.38	NE Eyewall
16	982720291	071927	30.25	89.94	
17	982010108	072854	30.06	89.17	W Eyewall (bad winds)
18	983310137	073402	30.03	88.70	Eye
19	982720314	075959	29.04	87.25	
20	982720369	073914	29.80	88.41	E eyewall
21	983310002	074105	29.71	88.31	E eyewall
22	983310035	080808	?	?	Rainband (bad winds)
23	981740040	081050	29.85	86.67	Rainband
24	982010058	081619	30.17	86.29	
25	982720315	082813	30.19	87.00	
26	982720396	084030	30.19	88.00	
27	982720394	085353	30.17	89.11	W eyewall
28	983310017	091347	30.24	88.83	Eye
29	983310030	091829	30.22	88.41	E eyewall
30	983310101	092021	30.22	88.25	E eyewall
31	983310072	093330	30.16	87.40	Rainband
32	983310026	094359	30.17	88.24	E eyewall
33	983310044	095513	30.17	89.10	W eyewall
34	983310079	105326	29.37	85.79	Far to east with AXBT

Figure 1

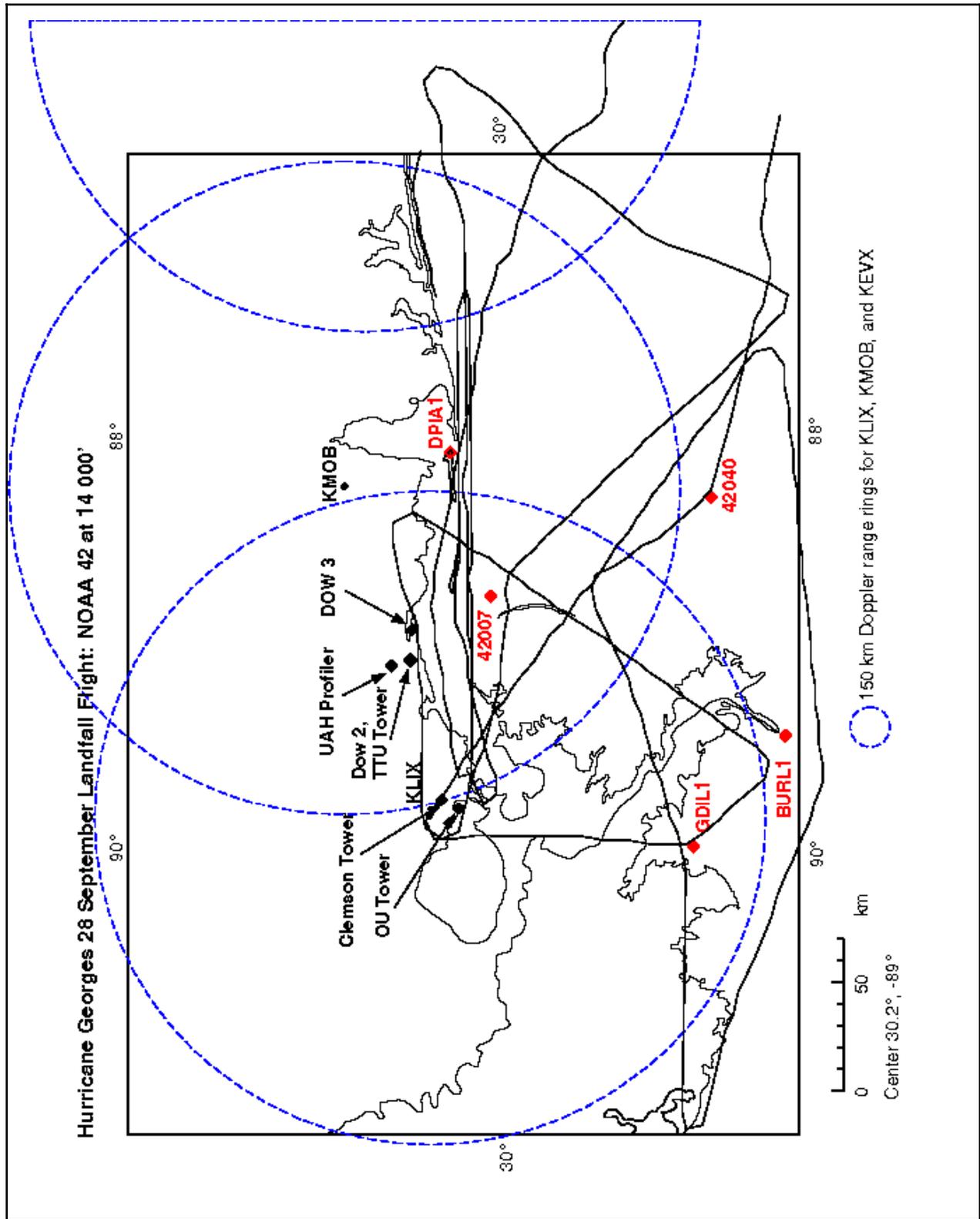


Figure 2

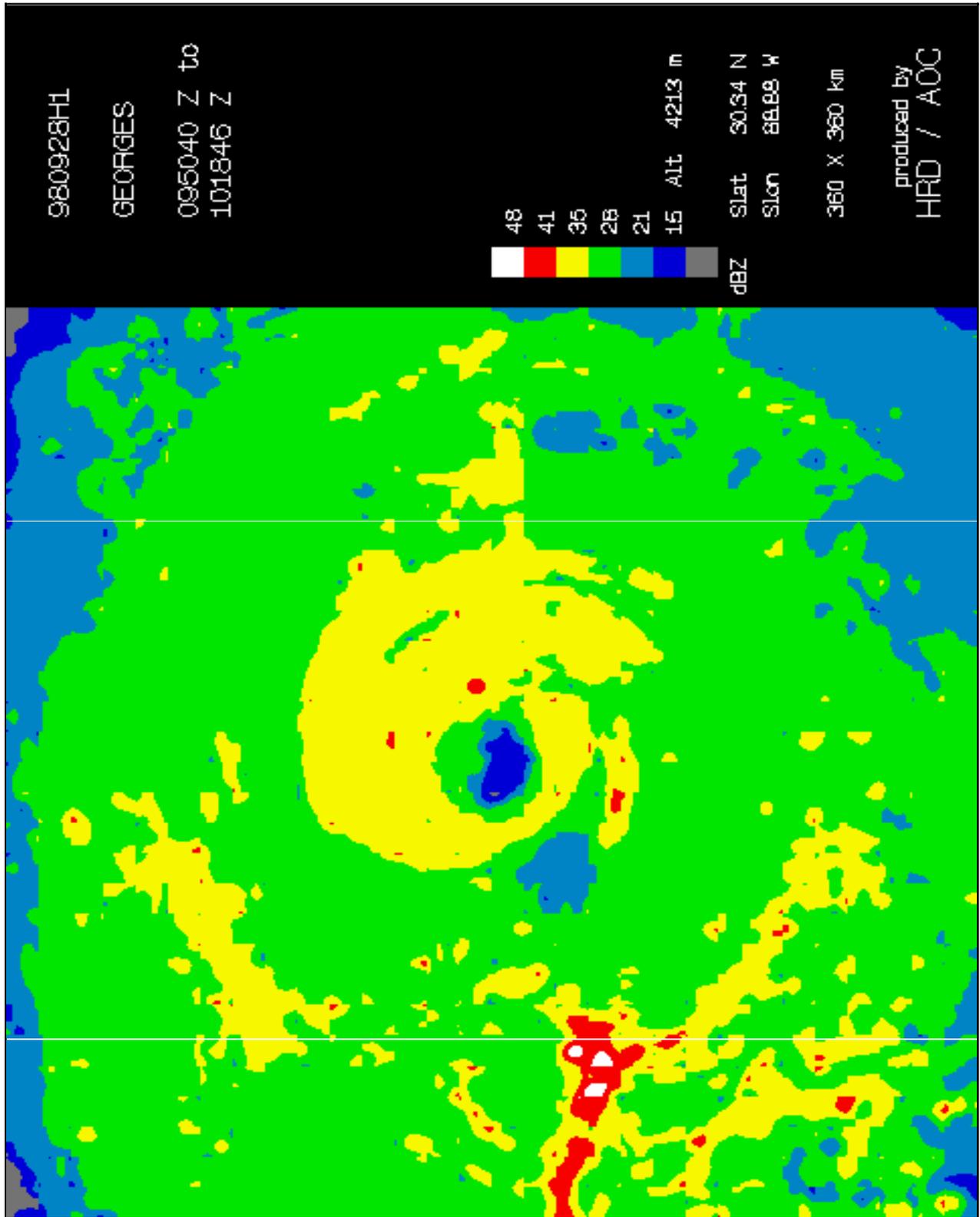


Figure 3

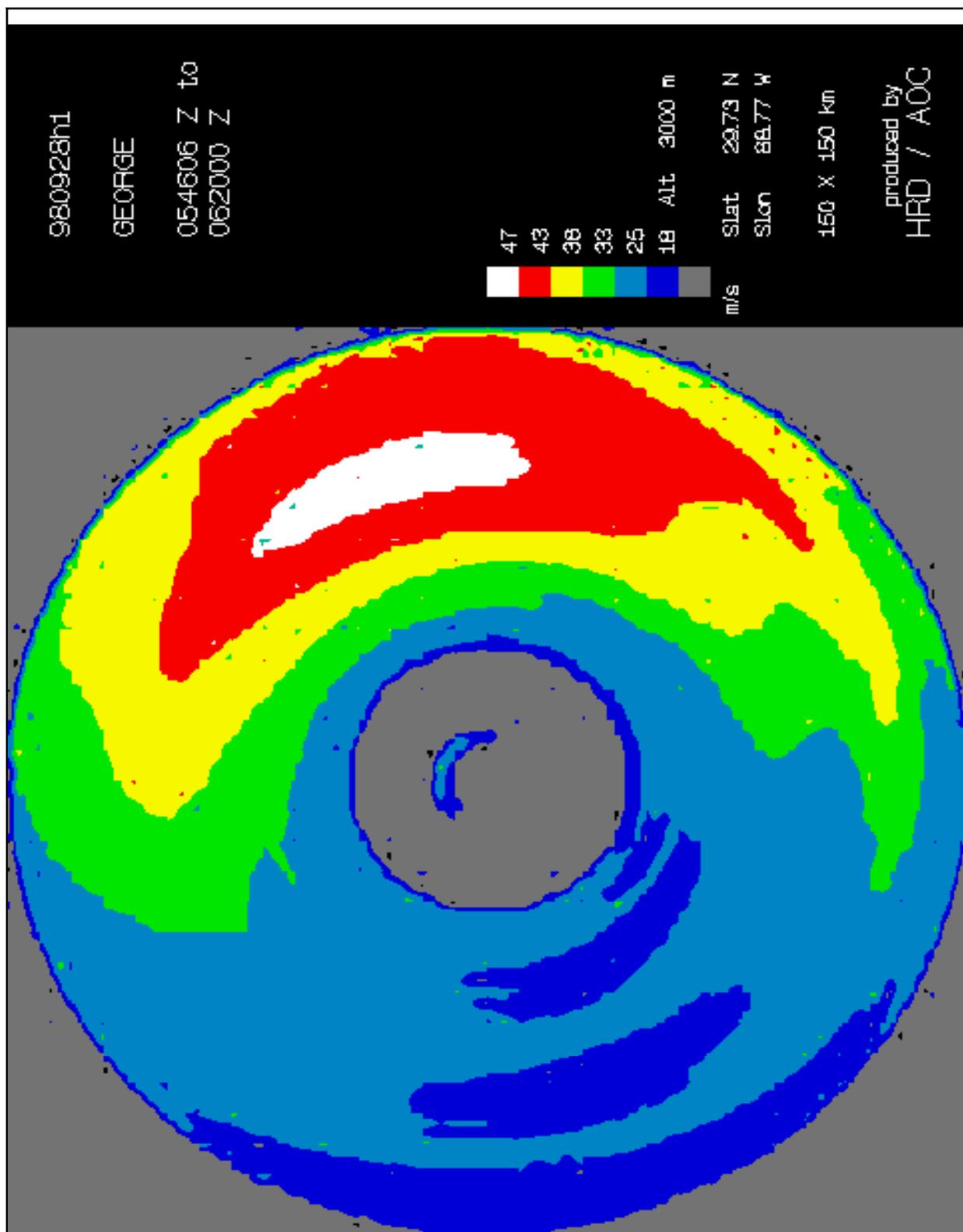


Figure 4

